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The Pattern Speed of the OH/IR Stars in the Milky Way [Victor P. Debattista, Ortwin Gerhard and Maartje N. Sevenster] Victor P. Debattista[1], Ortwin Gerhard[1] and Maartje N. Sevenster[2]

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abstract We show how the continuity equation can be used to determine pattern speeds in the Milky Way Galaxy (MWG). This method, first discussed by Tremaine & Weinberg in the context of external galaxies, requires projected positions, (l, b), and line-of-sight velocities for a spatially complete sample of relaxed tracers. If the local standard of rest (LSR) has a zero velocity in the radial direction ($u_{\rm LSR}$), then the quantity that is measured is $\Delta V \equiv \Omega_p R_0 - V_{\rm LSR}$, where Ω_p is the pattern speed of the non-axisymmetric feature, R_0 is the distance of the Sun from the Galactic centre and $V_{\rm LSR}$ is the tangential motion of the LSR, including the circular velocity. We use simple models to assess the reliability of the method for measuring a single, constant pattern speed of either a bar or spiral in the inner MWG. We then apply the method to the OH/IR stars in the ATCA/VLA OH 1612 MHz survey of Sevenster *et al.*, finding $\Delta V = 252 \pm 41$ $km\ s^{-1}$, if $u_{\rm LSR} = 0$. Assuming further that $R_0 = 8$ kpc and $V_{\rm LSR} = 220$ $km\ s^{-1}$, this gives $\Omega_p = 59 \pm 5$ $km\ s^{-1}\ kpc^{-1}$ with a possible systematic error of perhaps 10 $km\ s^{-1}\ kpc^{-1}$. The non-axisymmetric feature for which we measure this pattern speed must be in the disc of the MWG.